

**WHAT IS CLAIMED IS:**

1. A method for controlling power in a wireless communication system having a base station and a Multiple Carrier Power Amplifier (MCPA) split into at least two separate units, the method comprising the steps of:
- 5       coupling the at least two separate units with an interface;  
      providing an aggregate signal representing one or more carrier signals across the interface from the base station to the MCPA;  
      measuring a gain level during an interval; and  
      feeding back information across the interface from the MCPA to the base  
10       station associated with the measured gain level.
2. The method of claim 1, further comprising the step of:  
      adjusting the gain level of the MCPA to maintain a linear transmit power level associated with the aggregate signal.
3. The method of claim 1, further comprising the steps of:
- 15       providing a first and second control parameter from the base station to the MCPA across the interface; and  
      controlling the measuring of the gain level using the first and second parameters.
- 20       4. The method of claim 3, wherein the interface is digital and wherein the first and second parameters are power averaging period and sampling interval.

5. The method of claim 1, wherein the interface is digital and wherein the step of feeding back information further includes the step of:

defining a 100% load level associated with the MCPA;

5 feeding back information across the interface from the MCPA to the base station proportional to the measured gain level, wherein the information is linearly related to the measured gain level when the measured gain level is greater than or equal to the 100% load level.

6. The method of claim 1, wherein the interval corresponds to a synchronous interval.

10 7. The method of claim 1, wherein the interval corresponds to an asynchronous interval.

8. The method of claim 1, wherein the interval corresponds to a time slot interval.

15 9. The method of claim 1, wherein the wireless communication system further includes a plurality of base stations, the plurality of base station providing a plurality of aggregate signals to the MCPA, the plurality of aggregate signals each representing one or more carrier signals associated with one or more mobile stations served by each of the plurality of base stations, and wherein the method further comprises the steps of :

20 splitting the plurality of base stations and the MCPA into a plurality of separate units;

coupling the plurality of separate units with a plurality of interfaces;

providing the plurality of aggregate signals across the plurality of  
interfaces;  
measuring a gain level associated with the plurality of aggregate signals;  
and  
5 feeding back information across the interface from the MCPA to the base  
station associated with the measured gain level.

10. The method of claim 2, wherein the step of adjusting the gain level  
of the MCPA further includes the steps of:  
maintaining a first power level associated with a control channel signal in  
10 the aggregate signal; and  
autonomously adjusting one or more second power levels associated with  
remaining signals in the aggregate signal.

11. The method of claim 2, wherein the step of adjusting the gain level  
of the MCPA further includes the steps of:  
15 maintaining a first power level associated with a control channel signal in  
the aggregate signal;  
prioritizing one or more second power levels associated with remaining  
signals in the aggregate signal; and  
adjusting the one or more second power levels based on the prioritization.

20 12. The method of claim 11, wherein the step of prioritizing further  
includes assigning a higher priority to the remaining signals having relatively low  
power associated therewith.

13. The method of claim 1, wherein the step of adjusting the gain level of the MCPA to maintain a linear transmit power level associated with the aggregate signal further includes the step of:

- 5 maintaining a first power level associated with a control channel signal in the aggregate signal;  
receiving a priority over the interface from the base station to the MCPA, the priority associated with one or more second power levels associated with remaining signals in the aggregate signal; and  
adjusting the one or more second power levels based on the prioritization.

- 10 14. The method of claim 9, further comprising the steps of:  
adjusting the gain levels of the MCPA to maintain a linear output level associated with the plurality of aggregate signals; and  
measuring the gain level during an interval.

- 15 15. The method of claim 2, wherein the step of adjusting the gain level of the MCPA further includes the steps of:  
maintaining a first power level associated with a control channel signal in the aggregate signal; and  
adjusting one or more second power levels associated with remaining signals in the aggregate signal in the base station.

- 20 16. The method of claim 2, wherein the step of adjusting the gain level of the MCPA further includes the steps of:  
maintaining a first power level associated with a control channel signal in the aggregate signal;

prioritizing one or more second power levels associated with remaining signals in the aggregate signal in the base stations; and  
adjusting the one or more second power levels in the base station based on the prioritization.

- 5           17.    An apparatus for controlling power in a wireless communication system, the apparatus comprising:
- an interface;
  - a base station; and
  - a Multiple Carrier Power Amplifier (MCPA), the base station and the
- 10   MCPA being split into at least two separate units coupled through the interface, the MCPA configured to:
- receive an aggregate signal across the interface from the base station to the MCPA, the aggregate signal representing one or more carrier signals;
  - measure a gain level during an interval; and
- 15           feed back information across the interface from the MCPA to the base station associated with the measured gain level.
18.    The apparatus of claim 17, wherein the MCPA is further configured to:
- adjust the gain level to maintain a linear transmit power level associated
- 20   with the aggregate signal.
19.    The apparatus of claim 17, wherein the MCPA is further configured to:

receive a first and second control parameter from the base station across the interface responsive to the measured gain level; and  
control the measuring of the gain level using the first and second parameters.

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20. The apparatus of claim 19, wherein the wherein the interface is digital and wherein the first and second parameters are power averaging period and sampling interval.

21. The apparatus of claim 17, wherein the interface is digital and wherein the MCPA, in feeding back information, is further configured to:  
define a 100% load level;  
feed back information across the interface from the MCPA to the base station proportional to the measured gain level, wherein the information is linearly related to the measured gain level when the measured gain level is greater than or  
equal to the 100% load level.

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22. The apparatus of claim 17, wherein the interval corresponds to a synchronous interval.

23. The apparatus of claim 17, wherein the interval corresponds to an asynchronous interval.

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24. The apparatus of claim 17, wherein the interval corresponds to a time slot interval.

25. The apparatus of claim 17, further comprising:  
a plurality of base stations;  
wherein the plurality of base stations and the MCPA being split into a  
plurality of separate units coupled through the interface, the MCPA further  
5 configured to:  
receive a plurality of aggregate signals across the interface from the  
plurality of base stations to the MCPA, each of the plurality of aggregate signals  
representing one or more carrier signals;  
measure a gain level associated with the plurality of aggregate signals; and  
10 feed back information across the interface from the MCPA to the base  
station associated with the measured gain level.
26. The apparatus of claim 18, wherein the MCPA, in adjusting the  
gain level maintain the linear transmit power level associated with the aggregate  
signal is further configured to:  
15 maintain a first power level associated with a control channel signal in the  
aggregate signal; and  
autonomously adjust one or more second power levels associated with  
remaining signals in the aggregate signal.
27. The apparatus of claim 18, wherein the MCPA, in adjusting the  
20 gain level maintain the linear transmit power level associated with the aggregate  
signal is further configured to:  
maintain a first power level associated with a control channel signal in the  
aggregate signal;

prioritize one or more second power levels associated with remaining  
signals in the aggregate signal; and  
adjust the one or more second power levels based on the prioritization.

28. The apparatus of claim 27, wherein the MCPA, in prioritizing, is  
5 further configured to: assign a higher priority to the remaining signals having  
relatively low power associated therewith.

29. The apparatus of claim 18, wherein the MCPA, in adjusting the  
gain level maintain the linear transmit power level associated with the aggregate  
signal is further configured to:  
10 maintain a first power level associated with a control channel signal in the  
aggregate signal;  
receive a priority over the interface from the base station, the priority  
associated with one or more second power levels associated with remaining signals  
in the aggregate signal; and  
15 adjust the one or more second power levels based on the prioritization.

30. The apparatus of claim 25, wherein the MCPA is further configured  
to:  
adjust at least one of a plurality of gain levels to maintain a linear transmit  
power level associated with the plurality of aggregate signals; and  
20 measure the plurality of gain levels during an interval.



31. The apparatus of claim 18, wherein the MCPA, in adjusting the gain level maintain the linear transmit power level associated with the aggregate signal is further configured to:

5 maintain a first power level associated with a control channel signal in the aggregate signal; and  
autonomously adjust one or more second power levels associated with remaining signals in the aggregate signal in the base station.

32. The apparatus of claim 18, wherein the MCPA, in adjusting the gain level maintain the linear transmit power level associated with the aggregate signal is further configured to:

10 maintain a first power level associated with a control channel signal in the aggregate signal;  
prioritize one or more second power levels associated with remaining signals in the aggregate signal in the base station; and  
15 adjust the one or more second power levels based on the prioritization in the base station.